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would be interesting to know if others have observed anything like it in other localities.

About four inches of light dry snow fell during the afternoon and night of March 2. Towards the end of the storm the flakes were very large and the wind blew at a considerable velocity. This high wind continued most of the day of March 3. After the sun had been shining on the snow for three or four hours and had probably formed a thin layer of moist snow on top, the wind would catch up a portion of this moist snow and roll it over and over, forming a snowball of increasing size until the gust of wind had spent its energy, or the ball had become too large to be rolled any farther. Some people who saw this process taking place said that the fields were literally alive with moving snowballs. This peculiar phenomenon continued until about noon and the fields around Orono and Bangor were left with countless snowballs everywhere. Back of each snowball could be seen the triangular shaped path, from which the snow had been rolled up. In one instance this triangle was found to be approximately thirty-six feet in length, but that was for an unusually large snowball. The snowballs were of all sizes, from two or three inches in diameter up to nearly two feet. Of course the largest ones were formed where the ground sloped so that the ball rolled down hill, but even on the level some of the balls were a foot or more in diameter. One ball in particular, on which measurements were taken and recorded, was elliptical in shape, the horizontal diameter being twenty inches and the vertical diameter being fourteen inches. LEON ELMER WOODMAN

UNIVERSITY OF MAINE,
ORONO, MAINE

ON MEASURING THE DENSITY OF THE "17-YEAR LOCUST" POPULATION

TO THE EDITOR OF SCIENCE: According to the Bulletin of the Department of Agriculture No. 127, on the "17-year locust" of 1919 there was to be expected a very dense population of locusts this summer in the eastern and southern states. Brood 10 of the "17-year locust" and brood 18 of the "13-year locusts" are coincident this year. One of the items of inter-

est in the periodicity of these insects is the number of individuals appearing from time to time.

I wish to suggest a means of measuring the numbers of them in a manner that will make it easy to compare the density of them from year to year.

Wherever these cicadæ are there is produced an incessant screech. The intensity of this "screechy" sound is dependent upon the density of "locust" population. A measurement of the intensity of this sound may be referred to the density of the population in the environment where the intensity of the sound is produced. This is applying "sound ranging." The proper environment would have to be chosen.

This means would at least afford an excellent way to record the activity of the cicada during any one season; and might be developed to give relative seasonal activity also.

ENOCH KARRER

BUREAU OF STANDARDS

SCIENTIFIC BOOKS

World-Power and Evolution. By ELLSWORTH HUNTINGTON. New Haven, Yale University Press, 287 pp., 30 figures. 1919.

This is a far-reaching book, written in an interesting style, and is suggestive of thought along new lines, not only to students of evolution (especially those interested in the accepted laws of heredity), but to biologists, paleontologists, physicians and statesmen as well. The underlying thesis of the study is organic change, largely brought about by the changing environment, chiefly climate, which affects the well being and health of organisms. "Training, heredity and physical environment are like food, drink and air." They are necessary materials and conditions that are at the basis of all life. Humanity "does not yet realize that the human species must be bred as carefully as race horses," and even when people inherit perfect constitutions their health must receive much care. That climate largely underlies human health, this book abundantly demonstrates, and that it is a *changing* climate that develops the strongest

and most intellectual peoples is clearly set forth.

The author asks:

Have religion, education, philanthropy and government failed? Shall we despair because the church, the school, the charity organization, and the state have not yet destroyed war, pestilence, lust, greed, cruelty and selfishness? Far from it. These agencies can not possibly play their proper parts unless science comes to their aid. Not mechanical science, although that has its useful part to play, but biological science. The sum and substance of biology is evolution, the Darwinian idea that no type of living creature is permanent.

In this book health is studied, not from the standpoint of the physician, but from that of the geographer and evolutionist. Fluctuations in health, even the rise and decline of nations, are found to be conditioned by changes in the climate, in a small way, by the daily and seasonal changes, and in the large by the sweeping climatic ones that historians have as yet made so little use of in their interpretations of the fluctuations in national prosperity. The expansion of great nations

is to a large extent determined by climatic conditions. We talk, indeed, about trade, but back of trade . . . lies the question of health. Health, however, depends chiefly upon air, food and water; and all three of these depend upon climate. Every nation that has been stimulated by an energizing climate has apparently spread its power over neighboring regions either by land or by sea.

The author establishes his argument in a study of Health and Business, followed by other chapters on Business Cycles in Foreign Countries, How Health does its Work, and Climate and Health.

The prosperity curve follows the health curve with no apparent regard for the crops. Contrary as it seems to our established convictions, there appears to be no way of avoiding the conclusion that economic cycles of adversity and prosperity in the United States depend upon health far more than upon any other factor. And health depends largely upon the weather.

Aside from a good inheritance, which is of course the first essential, good health depends upon three material factors—proper food, proper drink and proper air and climate.

Air is the first necessity of life. We may live without food for days and without water for hours; but we can not live without air more than a few minutes. Our air supply is therefore of more importance than our food or water supply, and good ventilation becomes the first rule of hygiene.

Huntington says that it is not enough to understand man's extremely sensitive adjustment to temperature and humidity. We must understand the effect of changes. A *variable* climate has utterly different effects from a uniform climate, even though both have the same average temperature and humidity. This thesis is developed in the section on The Importance of Variability. One of the best possible safeguards of health is constant change of temperature. "We need to return to the conditions under which the evolution of our unclothed ancestors took place."

In the chapter called The Voyage of Evolution, we read of the rise of the organisms into man, and that the last glacial epoch was peculiarly stimulating toward the mental development of humanity. "The coldest places were not favorable, but on their borders where the climate was severe enough to be highly bracing, but not benumbing, there occurred an extraordinary development of brain power." Then follow chapters in The Environment of Mental Evolution, The Origin of New Types among Animals, and The Origin of New Types among Men.

The culminating chapters of the book come next in order. First in the one on The Example of Rome, we are told that mighty Rome fell because "men's energy and power of self-control, as well as their crops, were suffering at the behest of the inexorably changing climate." The human world to the north was disarranged by the same climatic change, and "the barbarians were constantly swooping down first on one part of the empire and then on another." The enervated Romans could not overcome the more vigorous peoples of the north. "So Rome fell, and her fall was followed by that period of unfavorable climate which is known as the Dark Ages."

In the chapter on The Problems of Turkey, we learn that:

In ancient days, when the climate of the Turkish empire was favorable, the ancestors of some of the present inhabitants were the leaders of civilization. To-day their descendants are crushed and discouraged by the insurmountable obstacles of nature. No wonder their spirit is broken, their children ignorant, their religion corrupt, and their government diabolical.

Truly Turkey is the sick nation of Europe, and her civilization corresponds to her physical environment.

This does not mean that she is forever doomed to misgovernment, race hatred and massacre. It does mean, however, that there is little hope of any favorable development from within.

We now attain to the climax of the book in a consideration of Germany and her Neighbors, and the Great War. Racial character, Huntington says, "is the effect of physical environment acting upon generation after generation." The Germans are living in one of the most invigorating climates, one that is superior to that of her enemies who live east and south of them, and it has made them the virile and persisting people that they are.

No other nation in the world has so many people who live under a highly stimulating climate. The German devotion to the national cause is like that which made early Rome so formidable.

Wherever and whenever the climate is stimulating, civilization seems to rise to a high level. The character of the civilization of course varies according to the race and training of the people. Yet no matter what the race, it seems under such circumstances to acquire the power to originate new ideas, to stick to them until they are carried out, and to impress its rule and its civilization upon the less favored people with whom it comes in contact.

CHARLES SCHUCHERT

NEW ACTIVITIES IN THE HISTORY OF SCIENCE

THE active interest in the history of science which exists at the present time in Europe is indicated by the numerous publications which are appearing and announced in this field.

In Italy the journal *Scientia* (*Rivista di Scienza*), *International Review of Scientific Synthesis*, is in its thirteenth year of publica-

tion. The present editor is E. Rignano, whose works are favorably known to American readers. This is a monthly publication (subscription at 33 francs per year, Felix Alcan, publishers, Paris), with articles in French, Italian and English, but articles in Italian and English are repeated in French translation. The title indicates the purpose, synthesis of science, of the journal, particularly to counterbalance the ill effects of over-specialization and also to have due regard for the bonds of unity among the different sciences. The social sciences and the history of science are included within the program of this publication. It deserves the hearty support of all scientists, particularly the support by subscription of college and technical libraries and by individuals.

Professor Gino Loria has published for nearly twenty years the quarterly journal, *Bollettino di Bibliografia e Storia delle Scienze Matematiche* (Torino, Rosenberg et Sellier, Via Maria Vittoria, 18). The editor is notable among historians of mathematics as a mathematician of the first rank, contributing equally to the field of pure mathematics and to the history of the science. This journal is always interesting and instructive, particularly valuable to all students of mathematics.

In March of this year appeared the first number of a new Italian publication, quarterly, devoted entirely to the history of science, the *Archivio di Storia della Scienza*. The editor, Professor Aldo Mieli, of the University of Rome, is a well-known contributor to the fields of the history and philosophy of the sciences. Each volume of the *Archivio* will consist of about 500 pages (foreign subscription 35 francs, Dott Attilio Nardecchia, Via dell'Umiltà, 14, Rome 19). While particular attention is to be paid to Italian science and scientists, all publications in the history of the various sciences and relating to the philosophy and development of science come within the range of the journal.

The first number contains the following articles and departments: G. B. De Toni, "Francesco Grisellini, viaggiatore e natural-